BASE Consulting Group, LLC
475 14th Street, Suite 500
Oakland, California 94612-1900
(510) 628-3300

Export Finance Systems, Inc.

Application Functionality Overview

30 June 1997

Daniel J. Gregory
Consultant

Table of Contents

Purpose

The purpose of this document is to record the results of an analysis where various long-term solutions were considered for managing the funding of receivables (an origin system). The proposed solution is discussed at a functionality overview level, as is each considered solution. This document also records the method used and factors considered when selecting a proposed solution.

Overview

Export Finance Systems, Inc. (EFS) is engaged in streamlining and automating the process of forward funding receivables. A tool authored in Microsoft "Access" is currently deployed to clients to track and manage these receivables and assure that specific requirements are met before submitting receivables to a bank for funding.

The entities (clients) involved in the system are:

- Bank – Potential purchaser of insured receivable.
- Insurance Company - Insures the receivable.
- Insurance Broker – Agent on behalf of the Exporter who arranges insurance on an export shipment.
- Buyer – Receives shipment exported from United States Exporter. Buyer owes Exporter for the shipment but doesn't pay until some time after shipment is received. Shipments via ocean take up to 3 weeks to reach destination.
- Exporter - Manufacturer of goods sold and forwarded to buyer. Awaits payment for goods from Buyer.
- Freight Forwarder - Agent(s) who move(s) goods from Exporter to Buyer.
- Export Finance Systems, Inc. (EFS) - System managers.

The current "Access" tool provides limited functionality since information can only be accessed by one user at a time at any client location and functionality does not currently exist for clients to share information (e.g. Exporter and Bank).

To succeed in the long-term, the current "Access" solution must be enhanced or a new system designed. This document discusses a mix of these approaches.

Functional Requirements

The EFS system must provide flexibility in support of a maturing Business Plan and provide functionality to the Exporter, Bank, Insurer and EFS.

It is believed that the EFS system will be used primarily by the exporter although recent requests have been received from bankers who seek a connected system for all of their exporters. Insurers are another potential service requester who may wish to manage insurance limits for each of their Exporters. This would be most useful in managing buyer and country limits.

Entity Requirements

Exporter

The Exporter has the need to track and manage insured and non-insured exports. To be able to sell receivables to a bank, the exporter must meet specific bank and insurance requirements. It is the management of these requirements that makes the EFS system especially valuable to the exporter.

The exporter needs to know what shipments were made, to whom and when. They need a tool that tells them at a glance the status of their insured and non-insured receivables, buyer and country limits, and available insurance. This tool must provide them the ability to make decisions about what to insure and what to forward to the bank for funding. The system must provide a series of reports that meets bank and insurer information requirements.

Insurer and Insurance Broker

The Insurer (and Broker) needs a tool that helps track Exporter, Buyer and Country limits, helps them assess risk and track receivables. The Insurance provider currently receives reports from the Exporter that shows the Exporter activities, exports made, shipments that are insured, insured levels by Buyer and country.

The EFS System would be useful in streamlining the process giving the Insurer more control and the Exporter faster response.

EFS

EFS needs system control to assure proper system function and to calculate charges for system use. EFS now controls the initial setup and input of all Buyers on the system.

Proposed Solution

After considering various options, I propose that the long-term solution be Internet based (Centralized - Internet). This solution provides for centralized application and data management, it will take advantage of emerging technologies, it provides good application and information security, reduced maintenance costs and is extremely scalable. In addition, it provides opportunity for a marketing presence that will help win clients. It can be tailored to meet the needs of EFS, the Exporter, the Insurer and the Bank.

This solution requires redesigning the current application with another tool – I recommend the Microsoft tool-set, which includes NT, Internet Information Server (IIS), Visual InterDev (VID), and SQL Server.

After researching options available for exporting the current "Access" application to VID, a redesign will be required. Although there is an upgrade path, VID requires that all objects be created within its application framework to be deployable and maintainable with VID. This makes sense because the methods employed by each solution ("Access" and VID) are quite different.

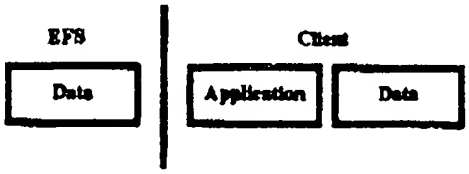
"Access" uses Forms and Visual Basic to process and retrieve database information for a single user. A local machine processes all components of the "Access" application and data.

VID retrieves requested information from a database and repackages it in hyper ext Markup Language (HTML) which is understood by the user's browser. Information is retrieved from the user applying limited business rules and communicated to EFS in HTML form. The current "Access" application will provide an excellent design model for this redevelopment.

This solution will employ an HTTP Server, a Database Server and a Workgroup Server. Each of these operates on Microsoft NT. An Internet Service Provider saving on Internet connectivity hardware (Router & CSU/DSU) could host this hardware and Internet Bandwidth costs (e.g. T-1 line).

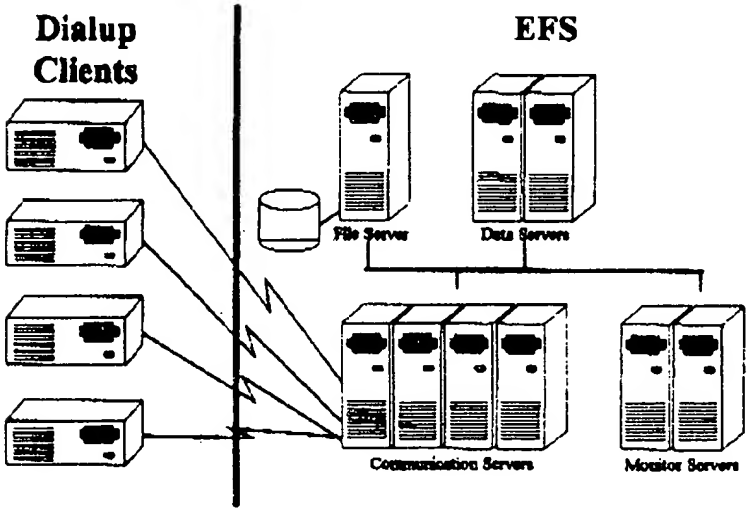
Alternatives Considered

Dialup Intranet



The Dialup Intranet topology provides for system users performing work on their own computer systems and periodically updating a central system through a brief dialup connection. Once updating the central system, new information is made available to other system users who have the need to know.

This topology requires that every system user have a computer with dial-out capability. A centralized system at the EFS office (Hub) is the central repository and distribution point of all information. The central Hub is comprised of communication servers, data Servers and monitor servers interconnected in either a client-server or peer-peer fashion.



Communication Servers

The Hub will employ multiple communication servers. These servers are standard PCs, each with a MODEM and a dedicated telephone line. The telephone lines which service the communication server pool will have the ring-busy rollover (hunt group) feature such that system users dialing in will use one phone number only. This line will service the first communication server in the pool. If this line is in use, a second, third, forth, etc. Line connected to a second, third, fourth, etc. communication server will be utilized.

The communication server will function as a data exchange agent. When accessed through dialup, it will answer the call, synchronize with the calling computer, verify login identity and password, record a log entry with client ID, date and time, accept data from the caller, transmit designated for the caller and disconnect the session. It stores incoming data in the proper client "IN" directory and transmits data from the proper client "OUT" directory.

Additionally, the communication server continuously updates a data table each minute with current date and time information. The monitor server continuously monitors this information so that early notification is enabled when a communication server functions improperly.

The communication server requires the design and implementation of specific software that does not already exist.

Data Server

The Hub will employ multiple Data Servers. These devices are standard PCs that store to a database, information received by Communication Servers. The data server also extracts information from the database (new information) and distributes it to appropriate client "OUT" directories.

The Data Server works from a task queue that is maintained by Communication Servers, Data Servers and Monitor Servers. A Data Server will first check if a task has an owner. If ownership has not already been designated for a task, the Data Server will assert ownership preventing another Data Server from doing the same. Once asserting ownership, the Data Server will accomplish its task and then release the task from the task queue. Examples of tasks are:

- Retrieving data received by a Communication Server and storing (update, insert, delete) this data to the central database.
- Initiating a new task to the task queue to distribute data recently stored to the central database.
- Distributing data from the central database to appropriate client "OUT" directories.

Additionally, the Data Server continuously updates a data table each minute with current date and time information. The monitor server continuously monitors this information so that early notification is enabled when a Data Server functions improperly.

The Data Server requires the design and implementation of specific software that does not already exist.

Monitor Server

The hub employs one or more monitor servers that watch the task queue and the individual machines (Communication Servers & Data Servers). It checks a status log each minute to make certain that every machine is reporting in (machine is probably functioning correctly). The Monitor Server reports on an exception basis and escalates using audio tones and by dialing a pager when a machine within the Hub fails to make a log entry within configured parameters.

The Monitor also makes entries in the status log each minute, which can be watched by another Monitor Server.

The Monitor Server requires design and implementation of specific software that does not already exist.

Assessment of Topology

Advantages

- Responsive to System user since work is performed locally and periodically updated.
- Good security since the topology is a closed system (the dialup is point-point and encrypted. Password security is used throughout).
- Application used at client site can be automatically distributed during update.
- Employs existing "Access" Application with modifications (dial-out communications)

Disadvantages

- High development costs associated with Communications server, data server, monitor server and modifications to current "Access" Application in support of communications.
- High Maintenance costs.
- Low application security -- Client has application with source code which could be stolen.
- Information is aged since it is conveyed through clients each performing a dialup at different intervals of the day.
- Risk of clients not updating information in a timely manner.

Evaluation Criteria

• Initial Cost	$ 57,000
• Incremental Cost	$ 113,000
• Reliability/Maintainability	High Cost
• Information Security	Low Risk
• Application Security	High Risk
• Response	High
• Scalability	Limited
• Client Perspective	Poor

- The number of devices drives the initial cost at the EFS facility and the development cost of the Data, Communication and Monitor Servers and required modifications to the current "Access" application.

- The added servers required as the client base grows drive the incremental cost.

- This topology is complex and brings with it management and maintenance complexity. Equipment failure is inherent with this topology since so many devices are required to make the system function. Failures that impact client use should be low since this topology has built in redundancy and fault tolerance.

- Information security is good since the data is centralized at the EFS facility. An exposure exists at the client facility since data related to the client is stored on the client local machine.

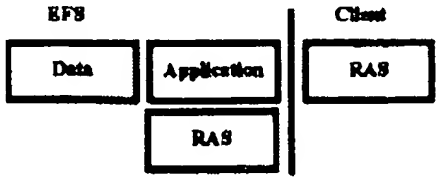
- Application security is at risk with this topology since the "Access" application resides at the client facility.

- The response of this topology should be high since both application and data needed by the client is local to the client. A response impact exists with the latency of information flow through the system (depends on timely updates by all concerned parties).

- This solution is scalable only to a point since the system will become unmanageable at high client levels because of the complexity of the system at these levels (reliability/Maintainability).

- Client perspective for this solution will probably be that the system is too costly to maintain and requires technical abilities outside the planned EFS staffing.

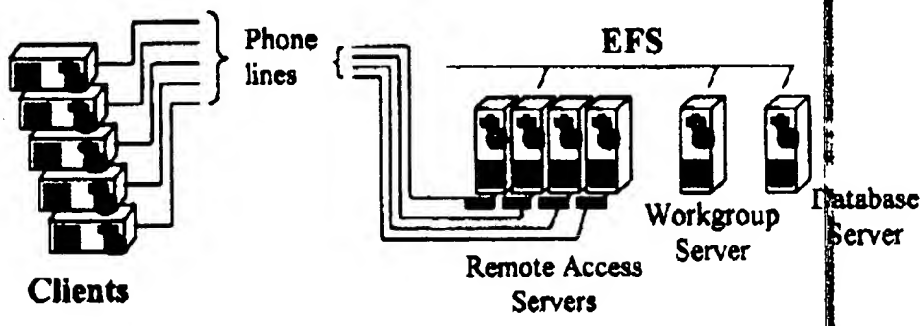
Remote Access Services – Dialup



This solution employs a centralized database with networked Remote Access Servers (RAS). Clients require standard PCs operating Microsoft NT Workstation or Windows '95/'97, Microsoft Remote Access Services and a modem.

The central system is scalable from a single Data Server/Remote Access Server to separate Data Server and multiple Remote Access Servers interconnected on a local area network.

This topology provides for clients dialing in to a Remote Access Server where the application resides. The application runs on the Remote Access Server and retrieves data from the Database Server (co-located with the RAS). The only information that is conveyed between the client and the RAS is keyboard and screens. All communication between the application and the database are between the Remote Access Server and Database Server.



Remote Access Servers

The Remote Access Servers are standard PCs running Microsoft Windows NT Workstation and Remote Access Services (RAS). Each has a modem and a dedicated telephone line. The telephone lines that connect the RAS Servers are configured in a hunt group such that if one is busy or does not respond to a ring within a specified amount of time, a rollover occurs to the next line in the hunt group.

Workgroup Server

The Workgroup Server is a standard PC running Microsoft Windows NT Server. This machine is required so that a single location can be used for staging the application and its components.

Database Server

The Database Server can be a standard PC or a Server class machine optimized for database use. This machine runs Microsoft Windows NT Server and Microsoft SQL Server which maintains all system data. Clients access the system via dialup to the RAS Server pool. The RAS Servers access the application on the Workgroup Server and the data via standard SQL from the data server.

Assessment of Topology

Advantages

- EFS can maintain centralized control of application and database since both reside at the EFS Facility.
- This solution offers a low startup cost because the existing "Access" application requires little or no modification. EFS can start out with as little as 1 machine running NT and RAS.
- This solution inherently has moderate maintenance costs because of the number of RAS machines for the long-term.

Disadvantages

- Because this solution is based on client dial-up to the EFS facilities, client will incur telephone charges. This can be transferred to EFS through the use of an 800 number but because each session is expected to be long (client does all work on-line), this could be costly.
- This solution will have high equipment and software costs associated with increasing volume. The larger the connected client base, the more machines that will be required to support it. Additionally, each client must operate a machine that is RAS compliant (e.g. Pentium with Windows NT). There will be therefore, significant equipment and software costs for client & EFS.
- Because this solution incorporates a modem for connected client and for EFS RAS machine, the system overall will appear to be unresponsive.

Evaluation Criteria

• Initial Cost	$ 6,000
• Incremental Cost	$ 58,000
• Reliability/Maintainability	Acceptable
• Information Security	Excellent
• Application Security	Excellent
• Response	Acceptable
• Scalability	Limited

- Client Perspective Acceptable

- The initial cost are for a standard PC with modem running Microsoft NT and RAS, a standard PC used as a data server/work group server running NT and Microsoft SQL Server, associated LAN components and a modem.

- The incremental cost reflects end-state costs based on EFS 5-year projections. This cost is for additional RAS machines, network connections and software licenses.

- Reliability for this topology is hinged on the reliability of the modems. This solution is maintainable since EFS would contract a maintenance provider to provide on-site maintenance with a 4-hour turn-around time. The phone lines that connect clients with RAS machines would be in a hunt group to forward immediately if busy and after three rings if a device connected to the line doesn't respond. The application is easily maintainable since it will reside in only one place -- on the Work Group Server. The RAS machines will share application resource files on the Work Group Server.

- Information Security is excellent since this topology is a "closed system" solution. Clients initiate a point-point connection with the RAS machines, are challenged with user authentication and once allowed into the system maintain a secure (encrypted) communication with the RAS. The database exists only at the EFS facility.

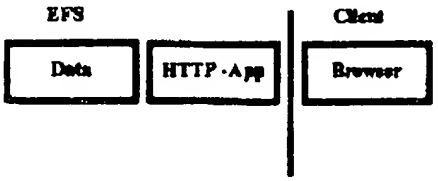
- Application Security is excellent since the application resides on the Work Group Server at the EFS facility (clients do not have a copy of the application).

- System response time should be acceptable. The bottleneck to information flow between the client and the data will certainly be the modems and connecting telephone lines. RAS communications through this bottleneck will consist of screen updates (from the RAS to the client) and keyboard commands (from the client to the RAS). The application runs locally at the EFS facility on the RAS. The connection between the application and the database is via the EFS LAN.

- Scalability for this solution is limited from a practical standpoint. The more clients, the more RAS machines and telephone lines will be required. At some point, this solution will become unreliable and costly to maintain. The EFS 5-year projections should not push this system past its limits.

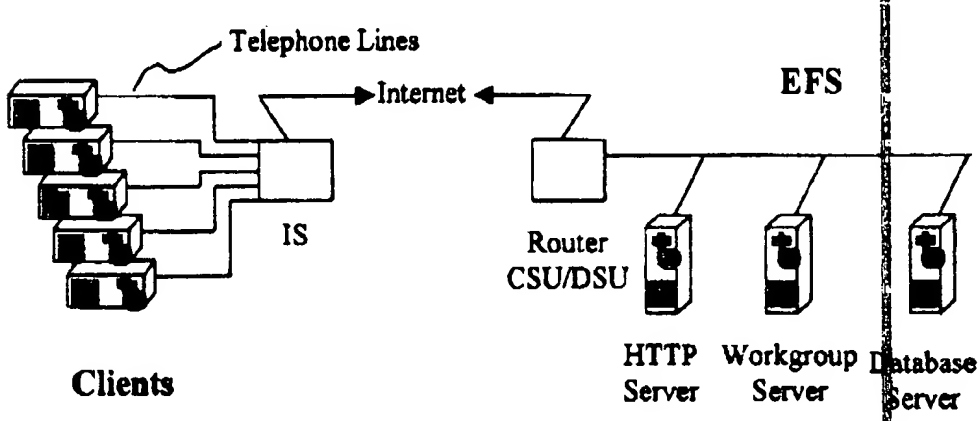
- Clients may feel that this system is sluggish. The current Internet hype may cause clients to feel that this solution is inferior to an Internet solution.

Centralized – Internet



This solution employs the Internet and HTTP. Each client requires a standard PC with modem and Internet connection through an Internet Service Provider (ISP). The database and application are centralized at EFS or at a host site.

The central system is composed of a hypertext Transport Protocol (HTTP) Server running Microsoft NT Server, Microsoft Internet Information Server (IIS), and Microsoft Visual InterDev Extensions. Also required is a Database Server running Microsoft SQL Server or Another SQL compliant database package (SQL Server is recommended for its compatibility with NT and Visual InterDev).



HTTP Server

The hypertext Transport Protocol (HTTP) Server can be a standard PC or preferably a machine optimized for Internet Server use. This machine runs Microsoft Windows NT Server, Internet Information Services (IIS), and components of InterDev & Front Page. It has connectivity to the Internet via Router and CSU/DSU. It has access to the database via Local Area Network and the Database Server.

Workgroup Server

The Workgroup Server is a standard PC running Microsoft Windows NT Server. This machine is required so that a single location can be used for staging the application and its components

Database Server

The Database Server can be a standard PC or a Server class machine optimized for database use. This machine runs Microsoft Windows NT Server and Microsoft SQL Server which maintains all system data. Clients access the system via dialup to the RAS Server pool. The RAS Servers access the application on the Workgroup Server and the data via standard SQL from the data server.

Assessment of Topology

Advantages

- This solution provides EFS with centralized control & maintenance of both application and data.
- This solution proposes the use of State-of-Art Visual Design tools. These design tools provide for rapid application design, ease of maintenance, and flexibility.
- Since this is a purely Internet application, this service could be hosted by one of the many Internet Service Providers who offer this service.
- The power of the proposed visual design tool coupled with centralized control provide a low cost application and data maintenance environment.

Disadvantages

- Because the current "Access" application functions vastly different than an HTTP service, the current application functionality must be retooled at a significant cost.
- System responsiveness will be significantly reduced from the current solution for clients who connect to the Internet via modem. For clients who access the Internet via Corporate T-1, system responsiveness will be good.

Evaluation Criteria

• Initial Cost	$ 150,000
• Incremental Cost	$ 2,500
• Reliability/Maintainability	High
• Information Security	Acceptable
• Application Security	High
• Response	Acceptable
• Scalability	Unlimited
• Client Perspective	High

- The initial cost is primarily driven by development activities. This figure is a midpoint estimate that could vary significantly. A more accurate estimate can be obtained only after a thorough design.

- The incremental cost is for additional hardware to enhance the system. Since this solution is scalable much past EFS 5-year projections, there should be no need to add hardware in the foreseeable future. If EFS decides to have this service hosted, any incremental costs will be for the expanding database.

- This solution is highly reliable and easily and cost effectively maintainable. It is unaffected by high volumes and application complexity.

- Although data resides on the EFS system, there is a manageable risk of hackers breaching the system. Using an appropriate encryption algorithm (e.g. Secured Sockets Layer (SSL) which is bundled into IIS and supported by most browsers can offset this.

- This solution offers the highest application security from others considered. This is due to the HTML layer that is results oriented (a user requests information of the HTTP Server which makes a SQL request of the database and repackages the result in HTML for delivery to the requesting user. The process behind the application is invisible to the connected user.

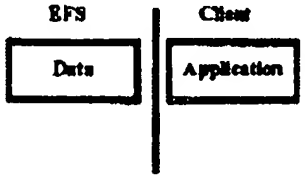
- Internet applications have an inherent time lag between operations. This is due to the slow nature of modems in general and is expected to improve substantially within the next few years. Users connected to the Internet via a modem will experience response degradation while users connected via a corporate T-1 will not.

- Scalability for this solution is not an issue. The application can be enhanced and client base expanded for little cost.

- It is my belief that clients will favor this solution over the others considered. The Internet is considered highly technical and the proper means of connecting

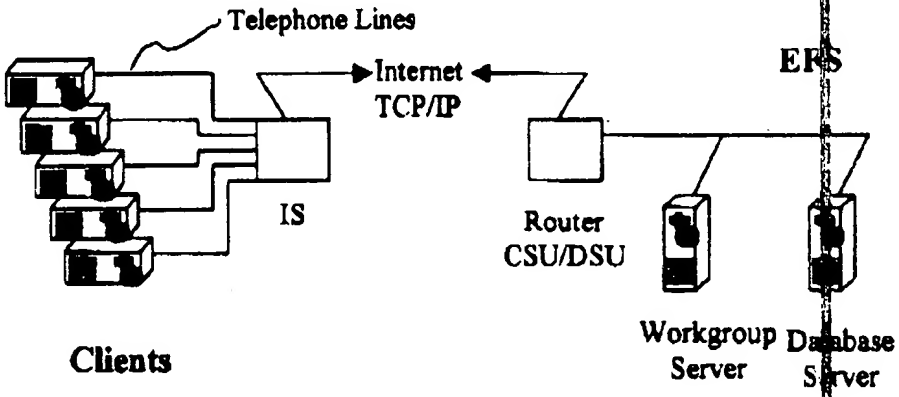
disparate entities to one system. Most business people use the Internet and believe that it has a certain future.

Decentralized - Internet TCP/IP



This solution connects clients up with the service via Internet Transport Control Protocol/Internet Protocol (TCP/IP). The client uses an Internet Service Provider (ISP) in a similar manner as accessing traditional Internet services via a modem connection from a standard PC. The connection to EFS Systems, Inc. is via a database communication protocol such as SQL Net (Oracle) which connects the user's application to the database. The application runs on the connected client PC against the database residing at EFS.

The central system (EFS) is comprised of a Database Server, Router, CSU/DSU and network. This solution is best served by Oracle because of the communications support for TCP/IP and the Internet.



Workgroup Server

The Workgroup Server is a standard PC running Microsoft Windows NT Server. This machine is required so that a single location can be used for staging the application and its components

Database Server

The Database Server can be a standard PC or a Server class machine optimized for database use. This machine runs Microsoft Windows NT Server and Microsoft SQL Server which maintains all system data. Clients access the system via dialup to

the RAS Server pool. The RAS Servers access the application on the Workgroup Server and the data via standard SQL from the data server.

Assessment of Topology

Advantages

- This solution gives EFS centralized control of data since all data is maintained at the EFS facility.
- This solution makes complete use of the existing application. The system functions very much like the existing "Access" application except that the data is centralized at EFS.
- Because the data is centralized, all information remains within the bounds of EFS. Using modern encryption technology (e.g. SSL), good information security is maintained.
- Although this is not a purely Internet solution, it may be a model that existing Internet Service Providers may be able to host.

Disadvantages

- Because the application is deployed to clients, there will be a significant challenge in maintaining the application and keeping it in sync with an evolving database structure.
- Because this solution depends upon modem dial-up access through the Internet, system responsiveness for most clients will be slow. For those clients using a Corporate T-1 Internet access, the response will be very acceptable.

Evaluation Criteria

• Initial Cost	$ 10,000
• Incremental Cost	$ 2,500
• Reliability/Maintainability	High
• Information Security	Acceptable
• Application Security	Low
• Response	Acceptable
• Scalability	Unlimited
• Client Perspective	Acceptable

- The initial cost is primarily driven by the hardware required. A Work Group Server Data Server, Router, and CSU/DSU will be required (hosting is a possibility).

- The incremental costs are for additional database licenses.
- This is a highly reliable and maintainable solution.
- Since the public Internet is used for this solution, there is a manageable risk of invasion by Internet hackers. This risk can be reduced significantly by using encryption and firewall technologies.
- Since the application for this solution resides on the client workstation, there is an inherent risk to EFS intellectual property.
- Response lag for this solution is due to the slow transmission speeds of modems. For clients who connect to the Internet via Corporate T-1, this response lag should be diminished.
- This solution is very scalable in that enhancements to the application are deployed to each client and adding transaction volume simply requires added bandwidth.
- I believe that clients will view this solution as acceptable but not as solid as a purely Internet solution. This is primarily because of the application deployment efforts required and the opportunity this brings for having the application and database out of sync at any particular time.

Decision Matrix

The following table illustrates the decision process by which the proposed solution was derived. The "Evaluating Criteria" column represents those factors used to differentiate one solution from the others. In parenthesis is the weight given each measure (higher weight given to higher values). These weights are applied to each solution as a multiplier.

The other columns are evaluated solutions with numerical values on a scale of 1 - 3 (lowest being best). These values represent relative superiority to other solutions for each evaluating Criteria (e.g. In evaluating the initial cost, "RAS Dialup" and "Decentralized Internet" were equally superior, Dialup Intranet was second best and Centralized Internet was least desirable (highest cost)).

For each solution, the weight found in the "Evaluating Criteria" column was applied so that the comparison was representative of EFS priority. The criteria weighting for each solution is represented in parenthesis (e.g. For the "Incremental Cost" criteria, "Dialup Intranet" received a raw value of 3 and a weighted value of 6 because the criteria weight for "Incremental Cost" is 2).

The "Weighted Totals" row represents the comparative value for each solution (lowest value is best). In this evaluation, the "Centralized Internet" solution compared more

favorably than the other solutions. Although its initial cost was the highest of the evaluated solutions, its incremental cost, reliability/maintainability, application security and scalability were best.

Evaluating Criteria (Weight)	Dialup Intranet	RAS Dialup	Centralized Internet	Decentralized Internet
Initial Cost (1)	1 (1)	0 (0)	3 (3)	0 (0)
Incremental Cost (2)	3 (6)	3 (6)	1 (2)	1 (2)
Reliability Maintainability (8)	3 (24)	2 (16)	1 (8)	1 (8)
Information Security (6)	1 (6)	1 (6)	2 (12)	2 (12)
Application Security (3)	3 (9)	1 (3)	1 (3)	3 (9)
Response (5)	1 (5)	2 (10)	2 (10)	2 (10)
Scalability (7)	3 (21)	3 (21)	1 (7)	1 (7)
Client Perspective (7)	3 (21)	2 (14)	1 (7)	2 (14)
Weighted Totals	**71**	**76**	**52**	**62**